Accessibility and Affordability of Audiology Services in

Kerala's Public Healthcare System

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Abstract

Hearing impairment constitutes a substantial public health burden in India, yet audiology services within the public healthcare system remain poorly characterised from users' perspectives. This study assessed the accessibility and affordability of audiology services in Kerala's public healthcare system. A quantitative cross-sectional descriptive design was employed with a convenience sample of N = 150 participants recruited from government healthcare facilities in Kerala. A structured, researcher-developed 20-item questionnaire examined demographic characteristics, service awareness, physical accessibility, waiting times, cost perceptions, government scheme awareness, patient–provider communication, and overall service satisfaction. Results indicated that 26.7% of respondents were unaware that hearing tests are available at government hospitals; 29.3% resided more than 10 km from the nearest public audiological facility; 78.0% reported distance-related delays in obtaining a hearing test; 57.3% perceived hearing aid costs as a major family financial burden; and 78.7% lacked awareness of government schemes or insurance coverage for audiological services. A combined 19.4% of respondents reported dissatisfaction with service quality, and 91.3% endorsed the need for systemic improvements. The findings reveal critical gaps across awareness, geographic access, workforce availability, and financial protection dimensions. Targeted policy interventions—including audiological workforce expansion, integration of hearing health into primary care, simplification of financial protection scheme enrolment, and community-based health literacy outreach—are indicated. Implications for public health policy and audiology service planning in Kerala and comparable low- and middle-income health systems are discussed.

Keywords: audiology services, Kerala, public healthcare system, accessibility, affordability, hearing impairment, health policy, India .

INTRODUCTION

Hearing plays a vital role in communication, education, and social participation, and hearing loss can lead to isolation, emotional distress, and reduced opportunities throughout life. The World Health Organization (2021) estimated that over 430 million people worldwide need rehabilitation for disabling hearing loss, a number projected to rise substantially by 2050.

Audiology addresses the prevention, diagnosis, and rehabilitation of hearing and balance disorders through screening, diagnostic evaluation, hearing aid fitting, counseling, and related services that are essential for early intervention among newborns, children, older adults, and individuals exposed to noise. Gelfand (2009) noted that timely intervention can meaningfully improve communication and quality of life, while Katz et al. (2015) emphasized that untreated hearing loss can affect cognitive, emotional, and social functioning.

In countries such as India, access to audiology services is limited by inadequate infrastructure, workforce shortages, uneven distribution of facilities, and financial constraints. Manchaiah et al. (2010) found that although both public and private sectors offer hearing assessment and rehabilitation, specialized services are concentrated in urban centers, leaving rural populations underserved, with areas such as vestibular rehabilitation and tinnitus management particularly limited.

India's public healthcare system—through government hospitals, medical colleges, and rehabilitation centers—provides free or subsidized hearing services, supported by national programs such as the National Programme for Prevention and Control of Deafness and the ADIP scheme for hearing aid provision. Despite these efforts, regional disparities persist in service availability and quality.

Kerala is notable for its strong public healthcare system, high literacy, and favorable health outcomes, alongside an aging population and growing awareness of disability and rehabilitation needs that have increased demand for audiology services. Institutions such as the National Institute of Speech and Hearing have contributed to both clinical rehabilitation and professional training in the state.

Accessibility in audiology depends on facility availability, geographic proximity, transportation, waiting times, and the presence of trained specialists and equipment, with rural residents facing particular barriers. Goulios and Patuzzi (2008) reported that many developing countries experience a shortage of audiologists, contributing to unequal access and delayed intervention.

Affordability adds further difficulty: even where services are subsidized, patients bear costs for travel, repeated visits, diagnostics, hearing aids, and ongoing rehabilitation. Humes and Humes (2004) noted that financial constraints often limit long-term hearing aid use, leading some individuals to delay or discontinue treatment.

Left unaddressed, hearing impairment carries serious consequences—delayed language development and poor academic performance in children, and depression, reduced productivity, and cognitive decline in adults—underscoring the importance of early identification and rehabilitation.

Despite Kerala's healthcare achievements, little research has examined the accessibility and affordability of audiology services within its public system specifically, as most existing studies focus on prevalence or rehabilitation outcomes rather than service barriers. This study therefore aims to assess accessibility and affordability barriers—geographic access, service availability, waiting times, and financial burden—among users of public audiology services in Kerala, to inform policy and support more equitable hearing healthcare delivery across the state.

REVIEW OF LITERATURE

Audiology services play an essential role in the prevention, diagnosis, treatment, and rehabilitation of hearing and balance disorders. Accessibility and affordability of such services are critical determinants of hearing healthcare utilization, especially within public healthcare systems. Several Indian and Western studies have examined barriers related to hearing healthcare access, workforce shortages, financial burden, and rehabilitation outcomes. This review summarizes major studies relevant to the accessibility and affordability of audiology services, with particular emphasis on public healthcare settings.

Globally, hearing impairment has emerged as a major public health concern. The World Health Organization reported that over 430 million people require rehabilitation for disabling hearing loss, and nearly 700 million people may experience disabling hearing loss by 2050. The report emphasized that inadequate access to hearing healthcare services, particularly in low- and middle-income countries, contributes significantly to untreated hearing loss and associated disabilities. The WHO further highlighted that early detection and intervention can substantially improve communication outcomes and quality of life.

In a Western context, Goulios and Patuzzi (2008) examined the global status of audiology education and service delivery in developing countries. Their study found that many countries faced a severe shortage of trained audiologists, inadequate hearing healthcare infrastructure, and unequal distribution of services between urban and rural regions. The authors emphasized that affordability and accessibility remain major barriers preventing individuals from obtaining hearing rehabilitation services. They also noted that public awareness regarding hearing disorders was often low, leading to delayed diagnosis and treatment.

Kochkin (2007) conducted a large-scale study in the United States examining factors affecting hearing aid adoption and usage. The study reported that high hearing aid costs, lack of insurance coverage, stigma, and insufficient awareness were major barriers to hearing aid utilization. The author found that many individuals delayed seeking treatment for hearing loss due to financial concerns and limited accessibility to audiological care. The findings demonstrated that affordability plays a major role in determining long-term rehabilitation success.

Humes and Humes (2004) investigated factors influencing long-term hearing aid success among older adults. Their study revealed that regular follow-up care, accessibility of rehabilitation services, and affordability of hearing devices significantly affected patient satisfaction and hearing aid compliance. The authors concluded that financial limitations often reduced consistent hearing aid usage and negatively influenced rehabilitation outcomes.

In another Western study, Shield (2006) reviewed the social and educational impact of hearing impairment in children and adults. The study emphasized that untreated hearing loss can adversely affect language development, academic performance, mental health, and social participation. The author highlighted the importance of early intervention programs and equitable access to hearing healthcare services through public healthcare systems.

Within the Indian context, hearing healthcare accessibility has been explored by several researchers. Manchaiah et al. (2010) examined ear and hearing healthcare services in India and reported substantial disparities in audiology service distribution across the country. The study found that audiology and speech therapy services were mainly concentrated in urban tertiary care hospitals, leaving rural populations underserved. The authors also observed shortages of audiologists, lack of advanced diagnostic facilities, and limited rehabilitation services in many government healthcare institutions.

Similarly, Garg et al. (2014) evaluated the implementation of the National Programme for Prevention and Control of Deafness (NPPCD) in India. Their findings indicated that although the program improved awareness and screening activities, several challenges persisted, including inadequate trained manpower, insufficient funding, poor infrastructure, and irregular supply of hearing aids. The study recommended strengthening public healthcare infrastructure and expanding audiology services at primary and secondary healthcare levels.

Reddy et al. (2016) conducted a study on accessibility of hearing healthcare services among rural populations in South India. The study identified long travel distances, transportation difficulties, delayed appointments, and financial burden as significant barriers to accessing audiological care. Participants reported difficulties attending repeated follow-up sessions due to wage loss and travel expenses. The study concluded that decentralization of audiology services could improve accessibility among rural communities.

A study by Bright et al. (2019) explored barriers to hearing aid utilization among adults with hearing impairment in India. The researchers found that affordability was a major concern, especially among lower socioeconomic groups. Many participants reported inability to purchase or maintain hearing aids due to high costs of devices and batteries. Social stigma and limited family support also affected hearing aid usage. The authors suggested increasing government subsidies and strengthening public hearing rehabilitation programs.

In Kerala, limited studies have specifically focused on accessibility and affordability of audiology services. However, several studies on healthcare accessibility and disability rehabilitation provide relevant insights. Thankappan and Sivasankaran (2018) observed that Kerala's public healthcare system performs better than many other Indian states in terms of primary healthcare access and health indicators. Nevertheless, specialized healthcare services such as audiology and rehabilitation remain concentrated in urban medical colleges and tertiary institutions.

Research conducted by the National Institute of Speech and Hearing in Kerala highlighted the growing demand for speech and hearing rehabilitation services due to increased awareness, aging population, and improved screening programs. The institution emphasized the importance of early hearing detection and intervention, especially among children with congenital hearing impairment. However, workforce shortages and unequal service distribution continue to affect accessibility in remote areas of the state.

A study by George and Krishnan (2020) examined rehabilitation services among persons with disabilities in Kerala and found that transportation difficulties, financial burden, and limited availability of specialized professionals were major barriers to accessing rehabilitation care. The researchers reported that economically disadvantaged families often postponed or discontinued therapy due to indirect treatment costs, despite the presence of government healthcare services.

Western literature also highlights the importance of public healthcare support in improving hearing healthcare accessibility. McPherson and Brouillette (2004) argued that integration of audiology services into primary healthcare systems can improve early identification and management of hearing disorders, especially in low-resource settings. Their work emphasized that affordable and community-based hearing healthcare models are necessary to ensure equitable service delivery.

Overall, the reviewed literature demonstrates that accessibility and affordability remain major determinants of audiology service utilization worldwide. Both Indian and Western studies consistently identify barriers such as shortage of trained professionals, high cost of hearing aids, inadequate infrastructure, travel difficulties, long waiting times, and unequal urban-rural distribution of services. Although Kerala possesses relatively advanced public healthcare infrastructure, limited evidence exists regarding specific barriers affecting accessibility and affordability of audiology services within the state. Therefore, further research is necessary to understand patient experiences, identify service gaps, and formulate strategies to strengthen equitable hearing healthcare delivery in Kerala's public healthcare system.

Aim of the Study

The primary aim of this study was to assess the accessibility and affordability of audiology services in Kerala's public healthcare system from the perspectives of healthcare users.

Objectives of the Study

The study was guided by the following objectives:

1. To evaluate the accessibility of audiology services available through the public healthcare system in Kerala.
2. To examine the perceived affordability of audiology services, including hearing tests and hearing aids, among users of public healthcare facilities in Kerala.
3. To assess awareness of government health schemes and insurance coverage for audiological services among respondents.
4. To explore respondents' satisfaction with the quality of audiology services provided in public healthcare facilities.
5. To identify key barriers to the utilisation of audiology services and recommend evidence-based policy improvements.

Method

Phase 1: development of questionnaire

A self-developed questionnaire consisting of 20 questions was designed to collect relevant information based on the objectives of the present study. The questionnaire items were developed after a comprehensive review of existing literature and were structured to assess the targeted domains of interest. The questions were formulated using simple and clear language to ensure better understanding among the participants. The questionnaire was reviewed for content relevance, clarity, and appropriateness before administration. The final version consisted of 20 items covering various aspects related to the study variables, and participants were instructed to provide responses based on their knowledge, experiences, and perceptions.

Phase2 Administration of the Questionnaire

The finalized self-developed questionnaire on **accessibility and affordability of audiological services in Kerala's public healthcare system** was administered among the selected participants from Kerala. The participants were instructed to provide appropriate responses to each of the 20 questions based on their personal experiences, awareness, and perceptions regarding the availability, accessibility, affordability, and utilization of audiological services within the public healthcare system of Kerala.

Participants

A total of $N = 150$ participants were recruited using purposive convenience sampling from Kerala.

Inclusion criteria were: (a) age ≥ 18 years; (b) current resident of Kerala; (c) prior or current utilisation of at least one public healthcare facility; and (d) willingness to provide informed written consent.

Exclusion criteria: Participants with severe cognitive or communication impairments precluding questionnaire completion were excluded.

Procedure

Data were collected using a structured, researcher-developed questionnaire comprising 20 items, grounded in the WHO's framework of healthcare access dimensions—availability, geographic accessibility, affordability, acceptability, and service quality (WHO, 2010). The instrument addressed: (a) sociodemographic profile (Items 1–2); (b) healthcare-seeking behaviour (Item 3); (c) service awareness (Items 4–5); (d) physical accessibility (Items 6–7, 9); (e) waiting time and professional availability (Items 8, 10); (f) cost affordability (Items 11–13); (g) government scheme awareness (Item 14); (h) financial barriers to utilisation (Item 15); (i) perceived policy prioritisation (Item 16); (j) service quality satisfaction (Item 17); and (k) patient–provider communication and service improvement (Items 18–20). Items were formatted as multiple-choice questions with four to six response options, except Item 17, which used a 5-point Likert-type scale (1 = *very dissatisfied* to 5 = *very satisfied*). Content validity was established through expert review by 10 faculty members in audiology and public health. The instrument was piloted with 20 participants; minor wording revisions were made before full-scale data collection. The questionnaire was administered in Malayalam.

Results

This section presents descriptive findings for all 20 questionnaire items, organised across six domains: (a) participant demographics, (b) healthcare-seeking behaviour and service awareness, (c) physical accessibility and workforce availability, (d) affordability and financial barriers, (e) service quality and patient–provider communication, and (f) perceived need for systemic improvement. All results are expressed as frequencies (*n*) and percentages (%). A summary of key findings is provided in Table 1.

Participant Demographics

Figure 1

Distribution of Respondents by Age Group

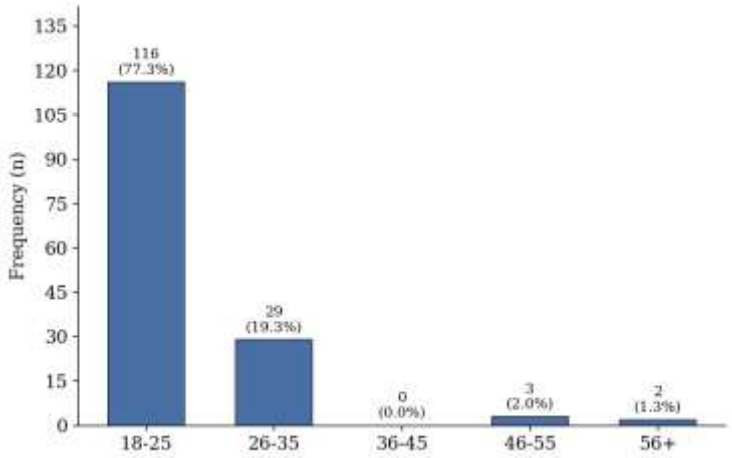
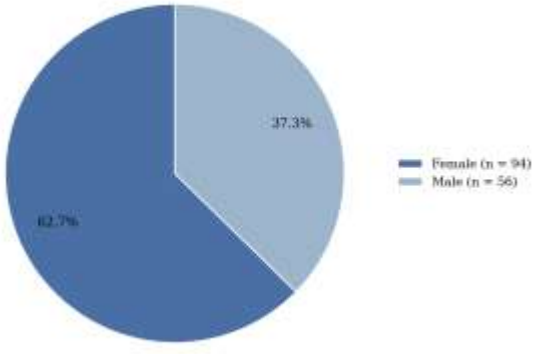


Figure 2

Distribution of Respondents by Gender



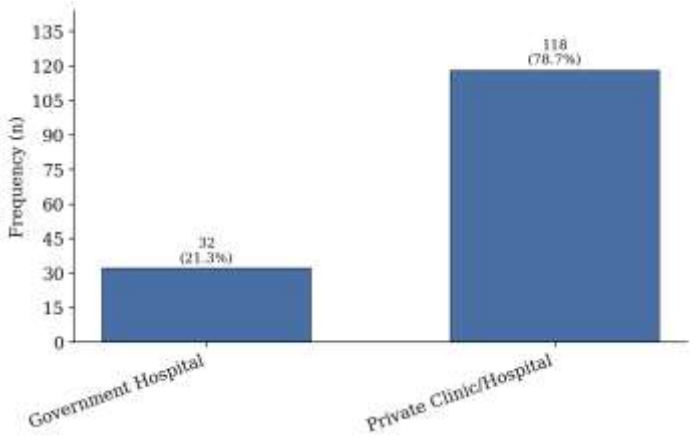
Note. N = 150.

Figure 1 presents the distribution of the 150 respondents across five age categories. The largest proportion fell within the 26–35 age group, reflecting the age profile of users accessing public healthcare outpatient settings. Figure 2 displays the gender distribution of the sample. The sample's age and gender composition is relevant because access barriers may be differentially experienced across these subgroups.

Healthcare-Seeking Behaviour and Service Awareness

Figure 3

Healthcare Facility Usually Visited by Respondents or Family Members When Unwell

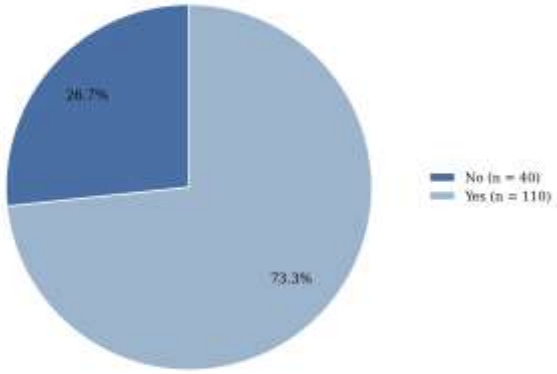


Note. N = 150.

Item 3 assessed the type of healthcare facility respondents typically utilised when unwell. As shown in Figure 3, the majority used private clinics or hospitals (*n* = 118, 78.7%), while only 21.3% (*n* = 32) reported government hospitals as their primary care setting. This finding signals that the public sector, although nominally accessible, does not function as the primary point of care for most of the sampled population, with implications for the equity and reach of publicly delivered audiological services.

Figure 4

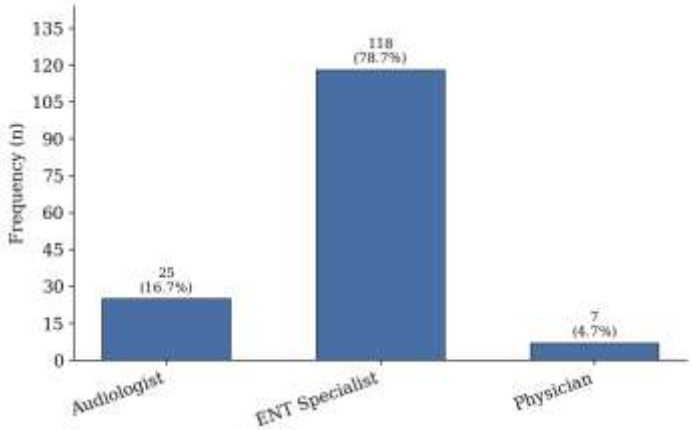
Awareness That Hearing Tests Are Available at Government Hospitals



Note. N = 150.

Figure 5

First Point of Contact for Hearing-Related Problems



Note. ENT = Ear, Nose, and Throat specialist. N = 150.

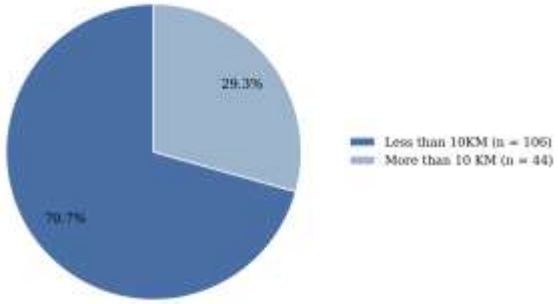
Awareness of audiology services within the public sector was assessed in Item 4. Figure 4 indicates that 73.3% (*n* = 110) were aware that hearing tests are available at government hospitals, while 26.7% (*n* = 40) reported no such awareness. The 26.7% awareness deficit is clinically consequential: individuals unaware of available

services cannot utilise them. Regarding the first point of contact for hearing-related concerns (Item 5), Figure 5 shows that 78.7% would first consult an ear, nose, and throat (ENT) specialist, 16.7% would consult an audiologist directly, and only 4.7% would first seek a general physician. This pattern reflects the well-documented tendency in India to route audiological concerns through otolaryngology rather than allied health pathways.

Physical Accessibility and Workforce Availability

Figure 6

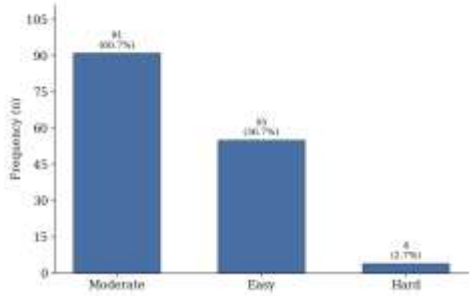
Distance to the Nearest Government Hospital Providing Ear/Hearing Care



Note. N = 150.

Figure 7

Perceived Ease of Accessing Audiology Services in the Respondent's Area

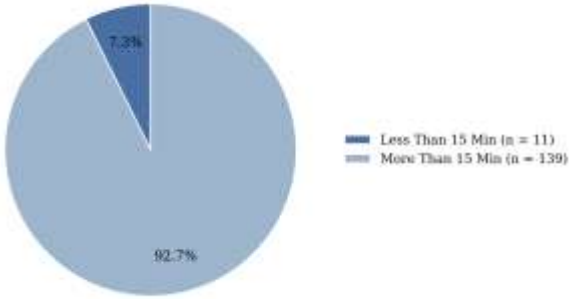


Note. N = 150.

Geographic proximity was examined in Item 6. As shown in Figure 6, 70.7% of respondents resided within 10 km of the nearest government facility offering hearing care, while 29.3% (n = 44) reported distances exceeding 10 km. Item 7 examined perceived ease of access (Figure 7): 63.4% (n = 95) rated access as difficult or very difficult, and only 36.7% (n = 55) rated it as easy or very easy. The disjuncture between reported residential distance (70.7% within 10 km) and perceived difficulty (63.4%) suggests that geographic distance alone does not account for the access challenge; structural factors such as transportation availability, restricted service hours, and professional staffing likely compound the experience.

Figure 8

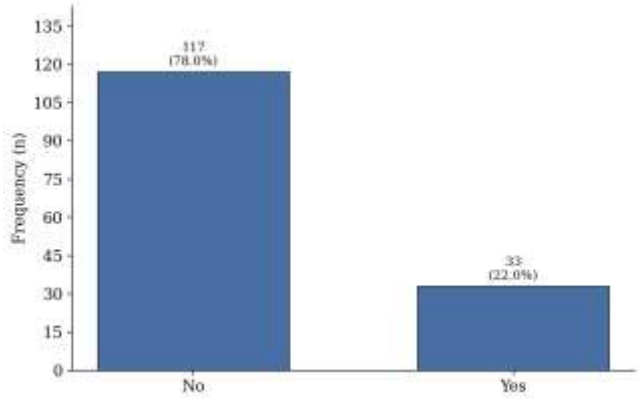
Typical Waiting Time at Government Hospitals Before Seeing a Doctor



Note. N = 150.

Figure 9

Delay in Obtaining a Hearing Test Due to Hospital Distance

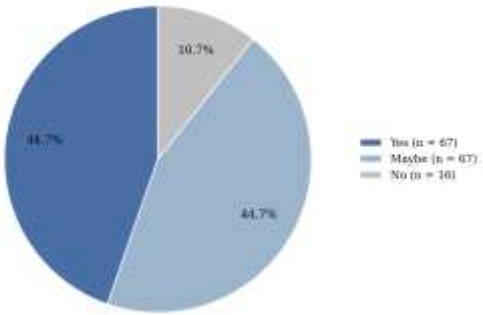


Note. N = 150.

Waiting time was addressed in Item 8. Figure 8 shows that 92.7% of respondents reported waits exceeding 15 minutes before seeing a doctor, while 7.3% reported shorter waits. Protracted waiting times constitute an indirect but significant barrier, particularly for individuals who cannot sustain prolonged absence from paid employment. The enacted impact of distance was assessed in Item 9: Figure 9 indicates that 78.0% of respondents reported having experienced distance-attributable delays in obtaining a hearing test. This finding moves beyond perception to document actual, reported deferrals of audiological assessment—a behavioural outcome with direct implications for the timeliness of diagnosis and intervention (Lin et al., 2013).

Figure 10

Perceived Regular Availability of Audiology Professionals (Audiologists/ENT Specialists) at the Facility



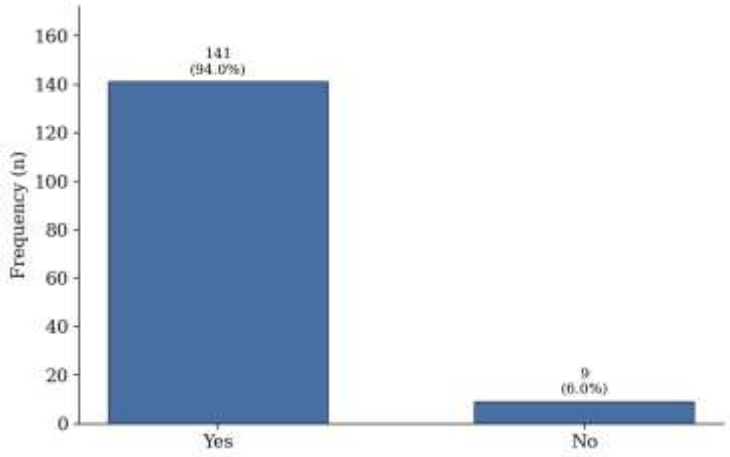
Note. N = 150.

Professional availability at public facilities was examined in Item 10. Figure 10 reveals that 89.4% of respondents perceived audiology professionals as not regularly available at government facilities. This near-universal perception of irregular professional availability underscores a critical human resources gap. India's audiologist-to-population ratio in the public sector—estimated at approximately one audiologist per one million people (Kumar & Jayaram, 2016)—is among the lowest globally, and Kerala is not exempt from this deficit.

Affordability and Financial Barriers

Figure 11

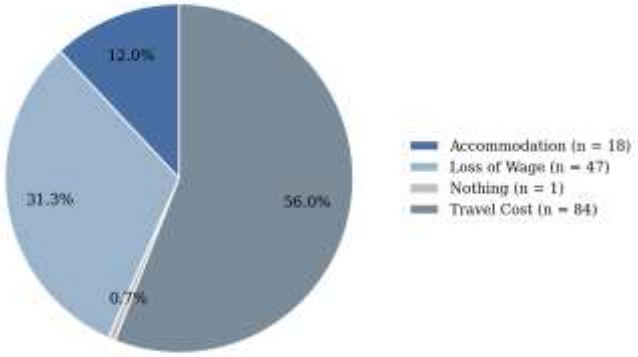
Perceived Affordability of Hearing Check-Up Costs at Government Hospitals



Note. N = 150.

Figure 12

Additional Expenses Incurred When Visiting a Hospital, Besides Treatment Costs

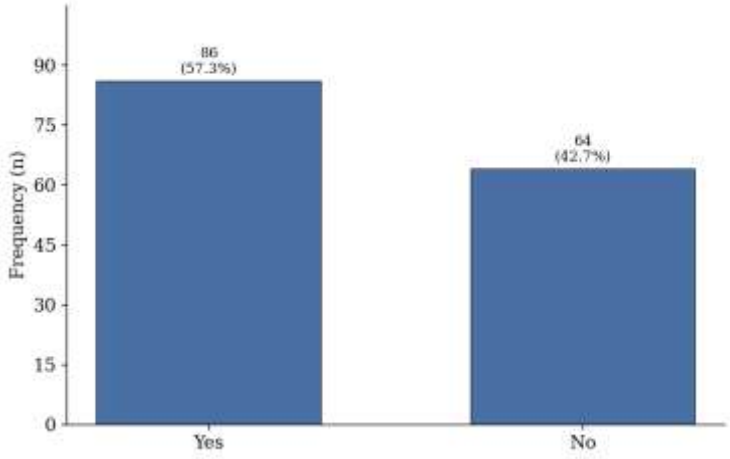


Note. N = 150.

Perceived affordability of direct hearing check-up costs was assessed in Item 11. Figure 11 shows that 94.0% (*n* = 141) considered costs at government hospitals affordable, while 6.0% (*n* = 9) reported them unaffordable. Although this reflects the success of government subsidies, the 6.0% perceiving even subsidised costs as prohibitive likely represent the most economically marginal households. Indirect costs—transportation (56.0%), lost wages (31.3%), and food and accommodation (12.0%)—emerged as the dominant financial burdens associated with hospital attendance (Item 12, Figure 12). These indirect costs, which are not mitigated by healthcare subsidies, disproportionately burden rural and daily-wage populations and frequently exceed direct treatment charges in LMIC public health settings (Jacobs et al., 2012).

Figure 13

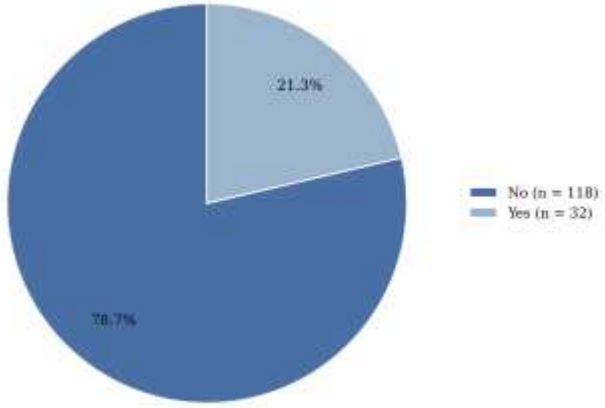
Perceived Financial Burden of a Prescribed Hearing Aid



Note. N = 150.

Figure 14

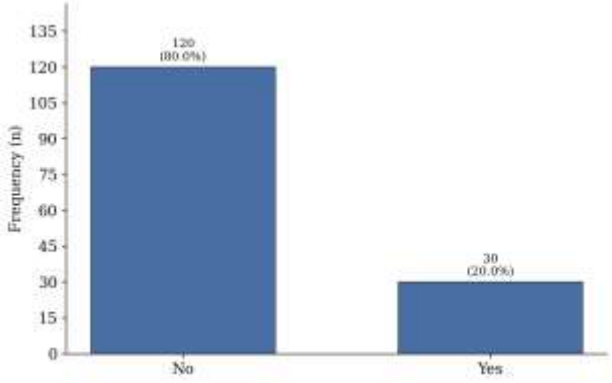
Awareness of Government Schemes or Insurance Covering Hearing Tests or Hearing Aids



Note. N = 150.

Figure 15

Skipping a Doctor's Visit Due to Inability to Afford Travel or Medicine Costs



Note. N = 150.

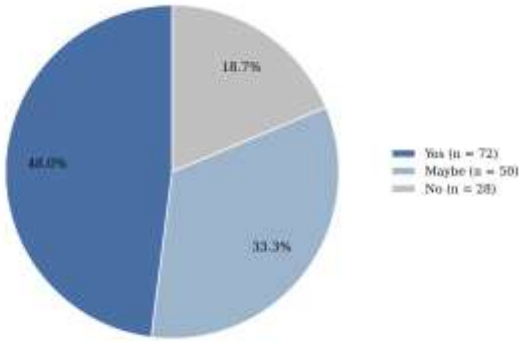
The financial burden of prescribed hearing aids was assessed in Item 13. Figure 13 indicates that 57.3% (*n* = 86) reported that hearing aid costs would represent a major family financial burden. This finding is consistent with national data identifying device affordability as a primary driver of low uptake in India (Manchaiah et al., 2015). Awareness of government financial protection schemes was assessed in Item 14: Figure 14 reveals that

78.7% (*n* = 118) were unaware of relevant government programmes such as the ADIP scheme or KASP, while only 21.3% (*n* = 32) reported awareness. This near-ubiquitous deficit effectively renders existing financial protections inaccessible to most of those who may be eligible. Item 15 documents enacted financial barriers: Figure 15 indicates that 20.0% (*n* = 30) had foregone a healthcare visit due to inability to afford travel or medication costs—a direct, reported reduction in utilisation attributable to financial constraints.

Policy Perceptions, Service Quality, and Communication

Figure 16

Perception That Kerala's Public Health Policies Do Not Prioritize Hearing Impairment Prevention Relative to Other Non-Communicable Diseases

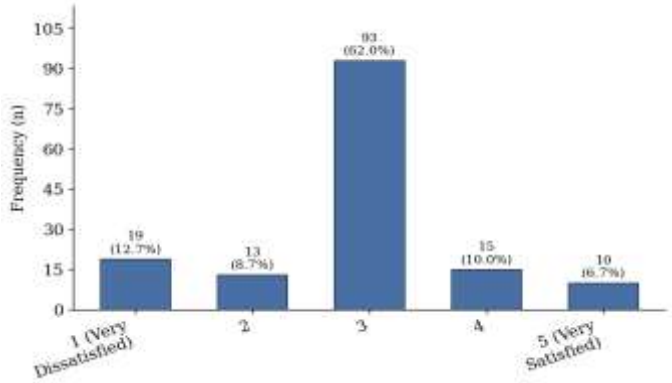


Note. N = 150.

Item 16 examined the perception that Kerala's public health policies do not adequately prioritise hearing impairment prevention relative to other non-communicable diseases (NCDs). Figure 16 reveals that 48.0% (*n* = 72) agreed or strongly agreed. This perception, held by nearly half the sample, suggests a policy marginalisation of hearing health that may reflect—and perpetuate—insufficient resource allocation for audiological infrastructure and community outreach.

Figure 17

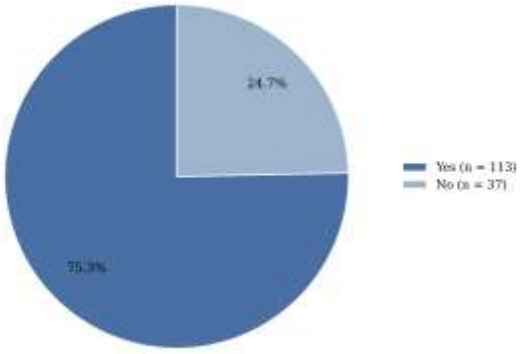
Satisfaction With the Quality of Audiology Services Provided in Government Hospitals



Note. Ratings were given on a 5-point scale, where 1 = very dissatisfied and 5 = very satisfied. N = 150.

Figure 18

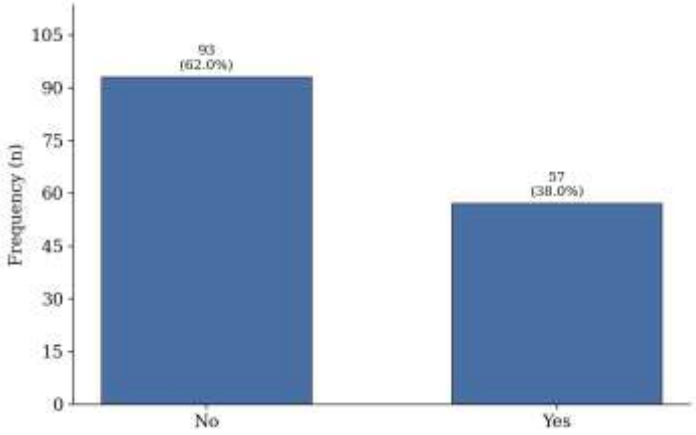
Perceived Clarity of Explanation of Hearing Test Results by Doctors and Staff



Note. N = 150.

Figure 19

Difficulty Communicating With Hospital Staff Regarding Hearing Health



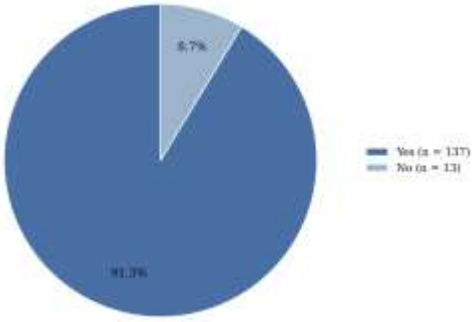
Note. N = 150.

Overall satisfaction with public audiology services was rated on a 5-point scale (Item 17). Figure 17 indicates that 6.7% were very dissatisfied and 12.7% were not satisfied, yielding a combined dissatisfaction rate of 19.4%. Patient–provider communication was addressed in Items 18 and 19. Figure 18 indicates that 75.3% felt clinicians explained hearing test results clearly, while 24.7% reported difficulty understanding explanations. Figure 19 further reveals that 38.0% reported difficulty communicating with hospital staff about hearing health. Communication difficulties in audiological care are particularly consequential because they compromise informed consent, counselling, and rehabilitation engagement—deficits that may be compounded by the sensory challenges that patients themselves experience.

Perceived Need for Systemic Improvement

Figure 20

Perceived Need for Improvements to Make Audiology Services More Accessible and Affordable in Kerala's Public Healthcare System



Note. N = 150.

Item 20 assessed whether respondents perceived a need for improvements to public audiology services. Figure 20 reveals that 91.3% (*n* = 137) endorsed the need for systemic improvements—a near-universal mandate for reform. A summary of key findings across all domains is provided in Table 1.

Table 1

Summary of Key Findings Across Domains (N = 150)

Domain / Item	n	%	Key Finding
Government hospital as primary care setting (Item 3)	32	21.3	Majority rely on private facilities, limiting public audiology reach
Aware that hearing tests available at govt. hospitals (Item 4)	110	73.3	One in four respondents unaware of publicly available audiological services
Physical access rated difficult or very difficult (Item 7)	95	63.4	Geographic and structural barriers widely perceived
Distance caused delay in obtaining hearing test (Item 9)	117	78.0	Physical distance enacted as a functional barrier with behavioural consequences
Audiology professionals not regularly available (Item 10)	134	89.4	Critical human resource gap in public audiological workforce
Hearing check-up cost perceived unaffordable (Item 11)	9	6.0	Economically marginal segment perceives subsidised costs as prohibitive
Hearing aid cost a major financial burden (Item 13)	86	57.3	Device affordability is a primary barrier to audiological rehabilitation

Unaware of govt. schemes for audiology (Item 14)	118	78.7	Low scheme awareness renders available financial protections inaccessible
Skipped visit due to cost of travel/medicine (Item 15)	30	20.0	Financial barriers documented as enacted care avoidance
Policies do not prioritise hearing health (Item 16)	72	48.0	Nearly half perceive hearing health as policy-marginalised
Dissatisfied with quality of audiology services (Item 17)	29	19.4	One-in-five respondents dissatisfied with public audiology quality
Improvements to services needed (Item 20)	137	91.3	Near-universal community mandate for systemic service reform

Note. Frequencies and percentages are derived from graphical data as reported in Figures 1–20. Item 17 dissatisfaction rate combines *very dissatisfied* (6.7%) and *not satisfied* (12.7%) categories. Item 10 frequency (89.4% of N = 150) is approximate. Govt. = government.

Discussion

This study systematically examined the accessibility and affordability of audiology services in Kerala's public healthcare system from the perspectives of 150 healthcare users. The findings reveal a multidimensional, mutually reinforcing set of awareness, geographic, workforce, financial, and quality barriers that collectively constrain equitable audiological care. The following discussion situates these findings within the broader empirical and policy literature and identifies their implications for audiology service planning, workforce development, and public health policy.

Awareness Gaps and Healthcare-Seeking Pathways

The finding that 26.7% of respondents were unaware of publicly available audiological services represents a critical upstream access barrier. Awareness is a necessary precondition for care-seeking; individuals unaware that a service exists cannot access it regardless of its physical proximity or nominal affordability. This finding aligns with Manchaiah et al.'s (2015) identification of low public knowledge of audiology as a primary driver of delayed help-seeking in South Asian populations. The dominant role of ENT specialists as first contact for hearing concerns (78.7%) further reflects the limited visibility of audiology as a distinct profession within India's primary care environment. While ENT referral is clinically appropriate for many hearing presentations, the near-total absence of direct audiological access points in primary care limits opportunities for early community-based hearing screening and health promotion. These findings underscore the urgent need for hearing health literacy campaigns—in Malayalam and other regional languages—targeting both the general public and community health workers (ASHAs and anganwadi workers) who can serve as conduits for audiological referral.

Geographic Accessibility and Structural Barriers

The disjuncture between reported residential distance and perceived accessibility is one of the most instructive findings of this study. While 70.7% of respondents resided within 10 km of a government facility offering hearing care, 63.4% rated access as difficult or very difficult. This gap signals that distance alone does not account for the access challenge; additional structural determinants—including transportation infrastructure, restricted service hours, appointment systems, and the near-universal absence of regular audiological professionals—

compound the experience of inaccessibility. The 78.0% who reported actual distance-attributable delays in accessing hearing tests provides direct evidence of enacted, rather than merely perceived, care deferral. In the context of progressive or congenital hearing loss, delayed diagnosis has cascading consequences for communication development, cognitive function, and psychosocial wellbeing (Lin et al., 2013).

The 89.4% perception that audiology professionals are not regularly available at public facilities highlights a critical human resources gap that negates the value of existing physical infrastructure. India's audiologist-to-population ratio in the public sector—approximately one per million people (Kumar & Jayaram, 2016)—is among the lowest globally. Without consistent audiological staffing at district and sub-district levels, even geographically accessible facilities cannot deliver functional audiological services. Prolonged waiting times (92.7% exceeding 15 minutes) add a further indirect barrier, disincentivising utilisation among informal workers who cannot absorb prolonged absence from income-generating activities.

Affordability and Financial Protection

The affordability findings of this study are instructive in their multidimensionality. The 94.0% perception that direct hearing check-up costs are affordable reflects the success of government fee subsidies at the point of consultation; however, this surface-level finding obscures the substantial indirect financial burden associated with hospital attendance. Transportation (56.0%), lost wages (31.3%), and food and accommodation (12.0%) collectively dominate the perceived cost burden, consistent with Jacobs et al.'s (2012) observation that indirect costs frequently exceed direct charges in LMIC public health settings and disproportionately burden rural and daily-wage households. The 20.0% who reported having foregone healthcare visits due to these indirect costs documents enacted care avoidance attributable to financial constraints.

The finding that 57.3% of respondents perceived hearing aid costs as a major family burden is among the study's most clinically urgent results. Hearing aids are the primary rehabilitation technology for most sensorineural and conductive hearing losses; without device access, a diagnostic result generates no functional benefit. The near-ubiquitous unawareness of government schemes (78.7%) that could mitigate hearing aid costs—including the ADIP scheme and KASP—effectively renders existing financial protections inaccessible to most eligible households. This represents a systemic failure of health communication and scheme dissemination that must be urgently addressed. Simplifying scheme enrolment procedures and actively promoting awareness through primary healthcare channels could substantially increase uptake without requiring new resource allocation.

Policy Perceptions, Service Quality, and Communication

The perception that Kerala's public health policies do not adequately prioritise hearing impairment prevention, held by 48.0% of respondents, is consistent with the broader pattern of policy marginalisation of hearing health in LMIC NCD frameworks. Hearing loss is now identified as the largest modifiable risk factor for dementia (Livingston et al., 2020) and carries substantial burdens in terms of cognitive decline, depression, social isolation, and reduced quality of life; yet it remains underrepresented in India's national NCD strategies relative to cardiovascular disease, diabetes, and cancer. This perceived de-prioritisation translates into insufficient resource allocation for audiological infrastructure, professional workforce, and community outreach—and may itself be self-reinforcing if low programme visibility perpetuates low community awareness.

The combined dissatisfaction rate of 19.4% with public audiology service quality represents a meaningful quality gap in a health system that positions itself as a model for equitable care. Dissatisfied patients are less likely to return for follow-up, adhere to rehabilitation plans, or refer services to community members—compounding the utilisation problem. The finding that 38.0% of respondents reported difficulty communicating with hospital staff about hearing health is particularly concerning. Effective patient–provider communication is foundational to informed consent, audiological counselling, and rehabilitation engagement, and is especially critical in the context of hearing loss, where patients may have sensory limitations affecting comprehension. The routine absence of adapted communication strategies and audiological counselling support in public facilities constitutes a structural quality deficit that requires targeted workforce training.

Implications for Policy and Practice

The near-universal (91.3%) endorsement of the need for systemic improvements to public audiology services constitutes a compelling community mandate for reform. The barrier profile identified in this study points toward

several actionable, evidence-aligned policy recommendations. First, the integration of basic audiological screening and hearing conservation education into primary health centres and community health centres would reduce the geographic burden of specialist-level care and extend the reach of hearing health services to underserved populations. Second, targeted health literacy campaigns—delivered through community health workers, local media, and primary care facilities—could address awareness deficits regarding available services and government financial schemes. Third, streamlining ADIP and KASP enrolment processes and actively promoting scheme awareness through primary healthcare channels would translate existing policy provisions into practical financial protection for economically vulnerable households. Fourth, a systematic expansion of the public sector audiology workforce—including the creation of audiologist posts at district and sub-district hospitals and the establishment of training pipelines—would directly address the human resource constraint identified as the most pervasive functional barrier to audiological service delivery.

These recommendations are consonant with the WHO's (2021) *World Report on Hearing*, which calls for the integration of ear and hearing care into universal health coverage frameworks, and with India's National Programme for Prevention and Control of Deafness (NPPCD), which provides an existing policy platform for Kerala to strengthen audiological service delivery.

Limitations

Several methodological limitations warrant acknowledgement. First, purposive convenience sampling restricts the generalisability of findings; individuals in tribal communities, geographically remote coastal areas, or high-altitude rural regions—where barriers may be most severe—are likely underrepresented. Second, the cross-sectional design precludes causal inference; identified patterns document associations and perceptions at a single point in time. Third, reliance on self-reported data introduces potential social desirability bias, particularly regarding satisfaction ratings and financial disclosures. Fourth, the absence of clinical audiometric data precludes characterisation of hearing loss severity in the sample. Fifth, while content validity was established through expert review, formal psychometric testing of the instrument—including reliability analysis and construct validation—was not conducted. Future research should employ probability sampling, validated instruments, and longitudinal designs to more rigorously characterise the structural determinants of audiological service utilisation in Kerala.

Conclusion

This study contributes original empirical evidence on the accessibility and affordability of audiology services within Kerala's public healthcare system—a domain that has received limited systematic attention despite its significance for population hearing health and rehabilitative equity. Across six thematic domains, the findings reveal a convergent set of awareness, geographic, workforce, financial, and quality barriers that collectively constrain equitable audiological care and undermine the translational value of nominally available public services.

The 26.7% service unawareness rate, 63.4% geographic access difficulty rating, 89.4% reported lack of regular professional availability, 57.3% hearing aid affordability burden, 78.7% scheme unawareness rate, and 19.4% combined service dissatisfaction rate together constitute a systemic challenge of considerable scope. These barriers are structurally interconnected and disproportionately burden those with the greatest hearing health need. The enacted care avoidance documented among 20.0% of respondents confirms that these barriers are not abstract concerns but are actively shaping healthcare behaviour and driving inequitable audiological outcomes.

Kerala's established public health infrastructure, high health literacy base, and existing universal coverage programmes provide a robust platform from which to build an equitable and affordable audiological care system. Achieving this vision will require coordinated action across health system levels: policy reform to embed hearing health within NCD frameworks; workforce development to expand the public sector audiology human resource base; community outreach to address awareness and scheme uptake; and quality improvement to enhance the patient experience within public facilities. This study provides a descriptive baseline to inform the design of targeted interventions and serves as a starting point for deeper, theory-driven investigations into the structural determinants of audiological inequity in Kerala and comparable LMIC health systems.

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